ENCLOSURE: TECHNICAL SUPPORT DOCUMENT FOR EPA CONCURRENCE ON 2017 WILDFIRE-INFLUENCED PM_{10} EXCEPTIONAL EVENTS AND THE EXCLUSION OF 2017 WILDFIRE-INFLUENCED DATA FOR PM_{10} LIMITED MAINTENANCE PLAN OPTION ELIGIBILITY IN MONTANA NONATTAINMENT AREAS

In the summer of 2017, the Montana Department of Environmental Quality (DEQ) identified that wildfires in Montana and upwind states may have caused exceedances of the 24-hour PM_{10} National Ambient Air Quality Standard (NAAQS) of 150 $\mu g/m^3$ and otherwise elevated PM_{10} concentrations at several monitoring sites operated by the DEQ. Under the Environmental Protection Agency (EPA) Exceptional Events Rule (EER), air agencies can request the exclusion of event-influenced data, and the EPA can agree to exclude these data from the dataset used for certain regulatory decisions. The remainder of this document summarizes the EER requirements, the requirements for excluding data under the Limited Maintenance Plan (LMP) policy, the wildfire events, and the EPA's review process.

EXCEPTIONAL EVENTS RULE REQUIREMENTS

The EPA promulgated the EER in 2007, pursuant to the 2005 amendment of Clean Air Act (CAA) section 319. In 2016, the EPA finalized revisions to the EER. The 2007 EER and the 2016 revisions added 40 CFR 50.1(j)-(r); 50.14; and 51.930 to the Code of Federal Regulations (CFR). These sections contain definitions, criteria for EPA approval, procedural requirements and requirements for air agency demonstrations. The EPA reviews the information and analyses in the air agency's demonstration package using a weight of evidence approach. The demonstration must satisfy all of the EER criteria for the EPA to concur with excluding the air quality data from regulatory decisions.

Under 40 CFR 50.14(c)(3)(iv), the air agency demonstration to justify data exclusion must include:

> A. "A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s)";
> B. "A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation";
> C. "Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times" to support requirement (B) above;
> D. "A demonstration that the event was both not reasonably controllable and not reasonably preventable"; and
> E. "A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event."[1]

In addition, the air agency must meet several procedural requirements, including:

> 1. Submission of an Initial Notification of Potential Exceptional Event and flagging of the affected data in the EPA's Air Quality System (AQS) in accordance with 40 CFR 50.14(c)(2)(i);
> 2. Completion and documentation of the public comment process in accordance with 40 CFR 50.14(c)(3)(v); and

[1] A natural event is further described in 40 CFR 50.1(k) as "an event and its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role. For purposes of the definition of a natural event, anthropogenic sources that are reasonably controlled shall be considered to not play a direct role in causing emissions."

3. Implementation of any applicable mitigation requirements in accordance with 40 CFR 51.930.

For data influenced by exceptional events to be used in initial area designations, air agencies must also meet the initial notification and demonstration submission deadlines specified in Table 2 to 40 CFR 50.14. We include below a summary of the EER criteria, including those identified in 40 CFR 50.14(c)(3)(iv).

Regulatory Significance

The 2016 EER includes regulatory language that applies the provisions of CAA section 319 to a specific set of regulatory actions. As identified in 40 CFR 50.14(a)(1)(i), these regulatory actions include initial area designations and redesignations; area classifications; attainment determinations (including clean data determinations); attainment date extensions; findings of State Implementation Plan (SIP) inadequacy leading to a SIP call; and other actions on a case-by-case basis as determined by the Administrator. Air agencies and the EPA should discuss the regulatory significance of an exceptional event demonstration during the Initial Notification of a Potential Exceptional Event prior to the air agency submitting a demonstration for the EPA's review.

Narrative Conceptual Model

A wildfire is defined in 40 CFR 50.1(n) as "any fire started by an unplanned ignition caused by lightning; volcanoes; other acts of nature; unauthorized activity; or accidental, human-caused actions, or a prescribed fire that has developed into a wildfire. A wildfire that predominantly occurs on wildland is a natural event." Wildland is defined in 40 CFR 50.1(o) as "an area in which human activity and development are essentially non-existent, except for roads, railroads, power lines, and similar transportation facilities. Structures, if any, are widely scattered."

The EPA expects that a narrative conceptual model of the event will describe and summarize the event in question and provide context for analyzing the required statutory and regulatory technical criteria. Air agencies may support the narrative conceptual model with summary tables, satellite images, maps, etc. For high particulate matter events resulting from wildland fires, the EPA recommends that the narrative conceptual model discuss the interaction of emissions and meteorology and, under 40 CFR 50.14(a)(1)(i), the regulatory significance of the requested data exclusion.

Clear Causal Relationship and Supporting Analyses

The EPA considers a variety of evidence when evaluating whether there is a Clear Causal Relationship (CCR) between the specific event and the monitored exceedance or violation. For high particulate matter concentrations resulting from wildland fires, air agencies should compare the relevant particulate matter data requested for exclusion with historical concentrations at the affected air quality monitor to establish a CCR between the event and the monitored data. In addition to providing this information on the historical context for the event-influenced data, air agencies should further support the CCR criterion by providing evidence that the wildfire's emissions were transported to the monitor and that the emissions from the wildfire influenced the monitored concentrations.

Not Reasonably Controllable or Preventable (NRCP)

The EPA requires that air agencies establish that the event be both not reasonably controllable and not reasonably preventable at the time the event occurred. This requirement applies to both natural events and events caused by human activities; however, if the event was caused by a wildfire on wildlands, it will be presumed that both "not reasonably controllable or preventable" elements have been met, unless evidence in the record clearly demonstrates otherwise.

Natural Event or Event Caused by Human Activity That is Unlikely to Recur

According to the CAA and the EER, an exceptional event must be "an event caused by human activity that is unlikely to recur at a particular location ***or*** a natural event" (emphasis added). The 2016 EER includes in the definition of wildfire that "[a] wildfire that predominantly occurs on wildland is a natural event." Once an agency provides evidence that a wildfire on wildland occurred and demonstrates that there is a CCR between the measurement under consideration and the event, the EPA expects minimal documentation to satisfy the "human activity that is unlikely to recur at a particular location or a natural event" element. The EPA will address wildfires on other lands on a case-by-case basis.

EXCLUDING DATA UNDER THE LIMITED MAINTENANCE PLAN POLICY FOR PM_{10} IN A MATTER ANALOGOUS TO THE TREATMENT OF DATA UNDER THE EER

For PM_{10}, the DEQ demonstration includes exceedance-level PM_{10} monitored values, as well PM_{10} monitored values between 98 $\mu g/m^3$ and 155 $\mu g/m^3$, as these values may be treated in a manner analogous to the treatment of exceedance data under the EER for the purposed of determining LMP option eligibility.[2] To be eligible for the LMP option, an area must show that the average design value for the area, considering the most recent 5 years of air quality data, is below 98 $\mu g/m^3$ for the PM_{10} standard and there are no violations at any monitor in the NAAs. A monitored value of 155 $\mu g/m^3$ or greater is determined to be an exceedance of the PM_{10} NAAQS. The LMP policy memo provides that data greater than 98 $\mu g/m^3$ which have been impacted by exceptional or natural events could be excluded in design value calculations consistent with policies in place in 2001. With the promulgation of the EER in 2007, a subsequent policy memo stated that:

"In determining eligibility for the limited maintenance plan option EPA will treat 24-hour average air quality data between 98 $\mu g/m^3$ and 155 $\mu g/m^3$ in a manner analogous to the treatment of exceedance data under the EER, provided the impacted data meet the general definition and criteria for exceptional events (natural event, or exceptional event that is not reasonably controllable or expected to recur.) "[3]

EPA REVIEW OF EXCEPTIONAL EVENT DEMONSTRATION AND OF DATA PROPOSED FOR EXCLUSION FROM CONSIDERATION UNDER THE LIMITED MAINTENANCE PLAN POLICY FOR PM_{10}

On March 5, 2018, the DEQ and EPA Region 8 conducted an initial notification telephone discussion for potential wildfire-caused PM_{10} exceptional events in the summer of 2017. The DEQ authored the

[2] Limited Maintenance Plan Option for Moderate PM_{10} Nonattainment Areas, US EPA, Lydia Wegman, Director, AQSSD, OAQPS, August 21, 2001, https://archive.epa.gov/ttn/pm/web/pdf/lmp_final.pdf.

[3] Update on Application of the Exceptional Events Rule to the PM_{10} Limited Maintenance Plan Option, US EPA, William T. Harnett, Director, Air Quality Policy Division, OAQPS, May 7, 2009, https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2/20090507_harnett_lmp_pm10_update_exc_event.pdf.

demonstration and provided a public notice and comment period from April 5, 2018 through May 5, 2018. On June 1, 2018, the DEQ submitted the final demonstration for wildfire exceptional events that have a potential to impact the 24-hour PM_{10} standard that occurred at the monitoring stations throughout Montana in the summer of 2017.

Regulatory Significance

On August 3, 2016, the DEQ submitted a redesignation request to the EPA for the Missoula PM_{10} NAA. Redesignations are one of the five types of regulatory determinations by the EPA Administrator to which the EER applies. In January 2017, the DEQ informed the EPA that it intended to develop maintenance plans and redesignation requests for additional PM_{10} NAAs. These areas include: Silver Bow County, Butte; Flathead County partial, Columbia Falls and vicinity; Flathead Country partial, Kalispell; Flathead Country partial, Whitefish and vicinity; Lincoln County partial, Libby; Sanders County partial, Thompson Falls and vicinity NAAs. It is the EPA's understanding that the DEQ is currently working on these maintenance plans and redesignation requests.

The DEQ indicated that they plan to use the LMP option when they submit their maintenance plans for these identified NAAs. As stated above, with the promulgation of the EER in 2007, a subsequent LMP policy memo stated that:

"In determining eligibility for the limited maintenance plan option the EPA will treat 24-hour average air quality data between 98 $\mu g/m^3$ and 155 $\mu g/m^3$ in a manner analogous to the treatment of exceedance data under the EER, provided the impacted data meet the general definition and criteria for exceptional events (natural event, or exceptional event that is not reasonably controllable or expected to recur.)"

Therefore, the DEQ demonstration includes exceedance-level PM_{10} monitored values, as well PM_{10} monitored values between 98 $\mu g/m^3$ and 155 $\mu g/m^3$, as these values can affect the eligibility of an area requesting redesignation to utilize the LMP option.

Table 1 summarizes the PM_{10} data for the seven NAAs that the DEQ has requested for the EPA to evaluate for exclusion from design value calculations for the purposes of determining eligibility for the PM_{10} LMP option. All these data were included in the DEQ demonstration submitted to the EPA on June 1, 2018. The EPA will evaluate the PM_{10} exceedances under the EER and consider the remaining data in a manner analogous to the rule in accordance with EPA's guidance on the LMP option. Therefore, although all of the submitted PM_{10} data will be evaluated in this technical support document (TSD), for the purpose of the EER the EPA will only concur with the exceptional event flags for those values that exceed the standard, have regulatory significance, and are considered exceptional events by definition. Additionally, for purposes of the LMP option, for those values in August and September 2017 that exceeded the LMP eligibility threshold of 98 $\mu g/m^3$ but were under 155 $\mu g/m^3$, the EPA will concur that the elevated PM_{10} concentrations were caused by wildfire smoke, and the data may be excluded when considering whether the areas are eligible for use under the LMP option.

Table 1. Summary of 24-hour PM_{10} Concentration ($\mu g/m^3$) Data to be Evaluated

Date	Site	AQS ID	24-hour PM_{10} Concentrations
August 12, 2017	Missoula	30-063-0024	105
August 23, 2017	Missoula	30-063-0024	129
August 29,2017	Missoula	30-063-0024	105
August 30, 2017	Missoula	30-063-0024	108
September 2, 2017	Butte	30-093-0005	111
September 3, 2017	Butte	30-093-0005	144
September 4, 2017	Missoula	30-063-0024	**233***
	Whitefish	30-029-0009	153
September 5, 2017	Kalispell	30-029-0047	131
	Libby	30-053-0018	104
	Missoula	30-063-0024	107
	Whitefish	30-029-0009	122
September 6, 2017	Columbia Falls	30-029-0049	**182***
	Kalispell	30-029-0047	**171***
	Libby	30-053-0018	101
	Missoula	30-063-0024	**158***
	Thompson Falls	30-089-0007	**251***
	Whitefish	30-029-0009	143
September 7, 2017	Columbia Falls	30-029-0049	**228***
	Kalispell	30-029-0047	**194***
	Libby	30-053-0018	134
	Missoula	30-063-0024	**201***
	Thompson Falls	30-089-0007	**231***
	Whitefish	30-029-0009	**212***
September 8, 2017	Columbia Falls	30-029-0049	**225***
	Kalispell	30-029-0047	**228***
	Libby	30-053-0018	**158***
	Missoula	30-063-0024	**193***
	Thompson Falls	30-089-0007	**249***
	Whitefish	30-029-0009	**215***
September 9, 2017	Columbia Falls	30-029-0049	126
	Kalispell	30-029-0047	154
	Missoula	30-063-0024	103
	Thompson Falls	30-089-0007	100
	Whitefish	30-029-0009	130
September 13, 2017	Columbia Falls	30-029-0049	102
	Kalispell	30-029-0047	**158***

* Exceedance flagged as exceptional event.

Narrative Conceptual Model

Butte, Columbia Falls, Kalispell, Libby, Missoula, Thompson Falls, and Whitefish are all located in the Rocky Mountains in western Montana. Columbia Falls (3,087 ft.), Kalispell (2,956 ft.), and Whitefish (3028 ft.) all lie within Flathead Valley, whereas Butte (5,538 ft.), Libby (2,096 ft.), Missoula (3,209 ft.), and Thompson Falls (2,556 ft.) lie along narrower river or stream valleys. The relative locations of the monitors are shown in the DEQ 2017 exceptional events demonstration.

Under typical circumstances, PM_{10} in western Montana is generally low with annual average concentrations around 10 to 30 $\mu g/m^3$. Excluding the effects of wildfire smoke, the highest concentrations often occur in the winter months, and are usually the result of temperature inversions and heating fuel combustion. Lower PM_{10} concentrations generally persist through the spring and summer. Elevated PM_{10} concentrations in summer almost always coincide with wildfire smoke, as indicated by wildfire flags applied to the data in AQS (see the Historical Data for Context section).

In 2017 over 10 million acres burned due to wildfires in the United States, which is the second largest annual loss on record behind 2015.[4] This included a loss of over 1.3 million acres in Montana, which is the largest annual loss in the last 15 years.[5] The conceptual model presented in the DEQ demonstration states that these numerous wildfires within and around Montana produced smoke that was transported to the monitoring sites in July through September. The smoke resulted in PM_{10} values that exceeded $98 \mu g/m^3$, and these values are much greater than the historical PM_{10} concentration at these sites which were unaffected by smoke. The remaining sections provide the DEQ's evidence for this model as well as the EPA response to this evidence.

Clear Causal Relationship and Supporting Analyses

Historical Data for Context

The 2016 EER recommends a number of analyses which could be of value in comparing flagged values to historical data. The supporting information recommends analyzing at least 5 years of data when comparing exceptional events to historical concentrations. Some of the analyses may provide more insight for a given demonstration than others, and not every analysis is required in every demonstration.

The analyses recommended in the Final Revisions to the EER Federal Register Notice,[6] and the location and degree to which the DEQ addressed these recommendations in their 2017 demonstration, are listed in Table 2.

[4] National Interagency Fire Center. "Total Wildland Fires and Acres (1960-2015)." Accessed May 9, 2018, https://www.nifc.gov/fireInfo/fireInfo_stats_totalFires.html.
[5] National Interagency Fire Center. "National Report of Wildland Fires and Acres Burned by State." Accessed June 6, 2018, https://www.predictiveservices.nifc.gov/intelligence/2017_statssumm/fires_acres17.pdf.
[6] Treatment of Data Influenced by Exceptional Events, Vol. 81 FR 68216 (final rule Oct. 3, 2016) (to be codified at 40 CFR parts 50 and 51).

Table 2. Recommended Analyses for Historical Data for Context Review

Recommendations	Pages in the DEQ Demonstration	Quality of Evidence	Comment
Compare the concentrations on the claimed event day with past historical data.	9 – 31	Sufficient	-
Demonstrate spatial and/or temporal variability of the pollutant of interest in the area	23 – 29	Sufficient	Analyses were completed for each of the sites, and demonstrate the temporal variability of PM_{10}
Determine percentile ranking	29 – 31	Sufficient	Percentiles are presented for 6 years of data for each site, and for each 2017 event in the demonstration
Plot annual time series to show the range of "normal" values (i.e., display interannual variability)	NA	-	-
Identify all "high" values in all plots	9 – 15; 23 – 29	Sufficient	2017 events and past data flagged with wildfire activity are identified in analyses
Identify historical trends (optional if this trends analysis provides no additional "weight")	NA	NA	This would not provide additional "weight"
Identify diurnal or seasonal patterns	23 – 29	Sufficient	Presented as tables and plots for each site

In conclusion, the comparison to historical data shows that the submitted exceptional events in 2017 are unseasonably high when compared to historical concentrations unaffected by wildfire smoke. Historically, only wildfire-impacted data are comparable to the 2017 submitted exceptional events in summer months, and the 2017 submitted exceptional events are among the highest values recorded over the evaluated period considering all seasons.

Evidence of Transport

The DEQ publishes Wildfire Smoke Updates on their website (http://deq.mt.gov/air/FireUpdates) for each smoke-impacted day in the state each year. These updates provide a summary, report and forecast

of the smoke-impacts in affected areas, and may be published multiple times per day depending on conditions. Updates may include a narrative of each event, photographs from affected areas, satellite images, NOAA smoke narrative for satellite images, NOAA smoke plume maps, and the health effect categories for cities and towns within the state for that day. Updates help to inform the public of areas affected by the smoke, understand where smoke may be coming from, determine potential health effects, and ways to reduce exposure. Past updates are archived on the Montana official state website (http://svc.mt.gov/deq/todaysair/smokereport/SmokeList.aspx?smokeYear=2017) for select years, and the DEQ included the entirety of the Wildfire Smoke Updates for each day submitted in the demonstration.

The EPA views these Wildfire Smoke Updates as sufficient for establishing evidence of transport of fire emissions from the fires to the monitors for each submitted exceptional event day.

Table 3 identifies the pages in the DEQ demonstration that include the Wildfire Smoke Updates for each affected day.

Table 3. Documentation of Evidence of Transport

Submitted Exceptional Event Date	Pages in the DEQ Demonstration	Quality of Evidence	Met Criteria
August 12, 2017	33-37	Sufficient	Yes
August 23, 2017	38-45	Sufficient	Yes
August 29, 2017	46-50	Sufficient	Yes
August 30, 2017	51-58	Sufficient	Yes
September 2, 2017	55-58	Sufficient	Yes
September 3, 2017	59-61	Sufficient	Yes
September 5, 2017	67-74	Sufficient	Yes
September 6, 2017	75-79	Sufficient	Yes
September 7, 2017	80-83	Sufficient	Yes
September 8, 2017	84-88	Sufficient	Yes
September 9, 2017	89-93	Sufficient	Yes
September 13, 2017	94-97	Sufficient	Yes

Not Reasonably Controllable or Preventable

The EER presumes that wildfire events on wildland are not generally reasonable to control or preventable. The DEQ demonstration includes a map of notable fires in 2017, and includes a table of the total acreage burned, the start and containment dates, and the cause for each fire. All but one of the ten fires were started by lightning strikes. The demonstration also includes a detailed map of each fire perimeter, and these maps show that much of the burned areas fell within National Forests wildlands.

Natural Event or Event Caused by Human Activity That is Unlikely to Recur

40 CFR 50.1 defines a wildfire as "any fire started by an unplanned ignition caused by lightning; volcanoes; other acts of nature; unauthorized activity; or accidental, human-caused actions, or a prescribed fire that has developed into a wildfire. A wildfire that predominantly occurs on wildland is a

natural event." Since the fires affecting Montana in August and September 2017 were largely on wildlands with unplanned ignitions, the exceptional events are considered natural events.

Schedule and Procedural Requirements

The EER requires that exceptional event demonstration submissions be accompanied by evidence that the required public comment process was followed, include any comments received, and address with the submission those comments received which dispute or contradict the factual evidence provided with the demonstration. Table 4 summarizes the EPA's review of these procedural requirements.

Table 4. EPA's Analysis of Schedules and Procedural Criteria

Criterion	Reference	Details	Criterion Met?
Did the agency provide prompt public notification of the event?	40 CFR 50.14 (c)(1)(i)	The public notice and comment period was from April 5, 2018 through May 5, 2018. The DEQ provided an electronic copy of the public notice for the record.	Yes
Did the agency submit an Initial Notification of Potential Exceptional Event and flag the affected data in the EPA's AQS?	40 CFR 50.14 (c)(2)(i)	The initial notification was delivered via phone.	Yes
Did the initial notification and demonstration submittals meet the deadlines for data influenced by exceptional events for use in initial area designations, if applicable? Or the deadlines established by EPA during the Initial Notification of Potential Exceptional Events process, if applicable?	40 CFR 50.14 Table 2 40 CFR 50.14 (c)(2)(i)(B)	The demonstration was submitted on April 24, 2017. There was no established deadline at that time.	Yes
Was the public comment process followed and documented?	40 CFR §50.14 (c)(3)(v)	One public comment was received, and the DEQ included the comment and response in the demonstration.	Yes
Has the agency met requirements regarding submission of a mitigation plan, if applicable?	40 CFR §51.930(b)	A mitigation plan was submitted for Montana on September 24, 2018.	Yes

CONCLUSION

After reviewing the documentation provided by the DEQ, the EPA has determined that all the September 2017 values exceeding the PM_{10} NAAQS and listed in Table 1 meet the definition of an exceptional event: the event affected air quality in such a way that there exists a CCR between the event and the monitored exceedance; was not reasonably controllable or preventable; and meets the definition of a natural event. The EPA has also determined that the DEQ has satisfied the procedural requirements for data exclusion under the EER.

In addition, for those values in August and September 2017 that exceeded the LMP eligibility threshold of 98 $\mu g/m^3$ but were under 155 $\mu g/m^3$, the EPA concurs that the elevated PM_{10} concentrations meet the general definition and criteria for exceptional events (natural event, or exceptional event that is not reasonably controllable or expected to recur), and thus in accordance with EPA guidance[7] those values may be excluded when considering whether the areas are eligible for use under the LMP Policy for PM_{10}. The EPA has also determined that the DEQ has satisfied the procedural requirements for data exclusion for these values that apply to the EER.

This concurrence does not constitute final EPA action regarding any matter on which the EPA is required to provide an opportunity for public comment. In particular, this applies to determinations regarding the attainment status or classification of the area. Final actions will take place only after the EPA completes notice and comment rulemaking on those determinations.

[7] Update on Application of the Exceptional Events Rule to the PM_{10} Limited Maintenance Plan Option, US EPA, William T. Harnett, Director, Air Quality Policy Division, OAQPS, May 7, 2009, https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2/20090507_harnett_lmp_pm10_update_exc_event.pdf.